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Research Fields?: Evidence from Top-50 Departments**

por

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**DOCUMENTO DE TRABAJO 2008-15**

Serie Capital Humano y Empleo  
CÁTEDRA Fedea – Santander

April 2008

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ISSN:1696-750X

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N.I.F. G-78044393

# Do men and women-economists choose the same research fields? : Evidence from top-50 departments\*

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This version: March, 2008

## ABSTRACT

This paper describes the gender distribution of research fields in economics by means of a new dataset about researchers working in the world top-50 Economics departments, according to the rankings of the Econphd.net website. We document that women are unevenly distributed across fields and test some behavioral implications from theories underlying such disparities. Our main findings are that the probability that a woman works in a given field is positively related to the share of women in that field (path-dependence), and that the share of women in a field decreases with their average quality. These patterns, however, are weaker for younger female researchers. Further, we document how gender segregation of fields has evolved over different Ph.D. cohorts.

**JEL Classification Codes:** A11, J16, J70.

**Keywords:** men and women- economists, research fields, gender segregation, path-dependence, multinomial logit models.

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*“In the 1960s and 1970s a large fraction of (the relatively small representation of) female economists chose “women’s topics- female labor supply behavior, gender discrimination, economics of the family, etc. The fraction is smaller today, but such topics are still disproportionate among new female Ph.D.s” [Daniel S. Hamermesh, 2005]*

## **1. Introduction**

Gender differences have been widely documented in the career paths of academics in most disciplines, including economics (see, e.g, Kahn, 1993, 1995). In general, despite women’s progress in academia, the academic job ladder is predominantly male-dominated. As regards economics, despite the fact that the percent of doctoral degrees (in the US) awarded to women increased from 7% in 1970 to almost 30% in the late 1990s (National Center for Educational Statistics, 2000) “old gender gaps” persist in various dimensions of academic research, including the choice of research fields. Thus, as in other scientific disciplines - e.g., medicine or psychology<sup>1</sup>- substantial narrowing in the overall gender gap in Ph.Ds awarded in economics misses the persistence of large gender differences in some research subfields. As the initial quotation by a prominent labor economist illustrates, there is a wide perception that women-economists are concentrated in some areas, generally coined as “female” fields. The issue we address here is whether such a perception can be substantiated by empirical evidence. In particular, we have two questions in mind: *Are there significant and persistent gender differences in the choice of research fields in economics?* and, if so, *Why?* .

The persistence of gender gaps in research can be framed into the more general issue of women’s lack of representation in high professional jobs. Some commentators argue that there might be intangible barriers (“glass ceilings”) limiting female advances to the top managerial and professional jobs, an opinion has been rationalized in the economics literature by several explanations ranging from women’s self-selection into less selective occupations or certain social networks, to taste discrimination by employers and, more recently, different gender attitudes in highly competitive

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<sup>1</sup> For instance, there is ample evidence on female physicians being overrepresented in pediatrics or obstetrics and underrepresented in surgery or orthopedics. Likewise, female psychologists are over-represented in clinical and environmental psychology and underrepresented in neuropsychology.

environments. Although the plausibility of each of them differs according to alternative contexts, the traditional paucity of datasets on this type of occupations has made it difficult to discriminate among them. Fortunately, this problem is becoming gradually overcome by empirical studies which use new micro-data bringing detailed socio-economic characteristics of men and women in high-profile jobs.<sup>2</sup> Since academic jobs fall into this category, our paper aims at contributing to this stream of the empirical literature on gender gaps by using a new dataset compiled by us to describe patterns characterizing the changing sex composition of research fields in economics and its determinants.

A useful departure point is to recall the initiative of the American Economic Association (AEA) in the early seventies of setting up a *Committee on the Status of Women in the Economics Profession* (CSWEP).<sup>3</sup> As a consequence, there has been a large number of studies, especially in the US, on how the prospects of female academic economists have evolved over the last two decades, in parallel with women making great inroads in the economics profession.<sup>4</sup>

However, the existence of gender differences in the distribution of academics across areas of specialization in economics research, and the reasons behind potential disparity across different fields, has attracted much less attention. Insofar as choice of research field may influence publications and therefore promotions, analyzing the determinants of such choices may be helpful in understanding women's performance in economics in general. Indeed, the only research about this topic that we are aware of is Hale (2005, unpublished) and Boschini and Sjögren (2007). In the first study, the author uses several waves of a database of members of the AEA in ten of the top economics departments in the US to address the central question of whether there is path-dependence in women's choice of fields. The evidence found is supportive: the higher is the share of women in a given field in a given year the

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<sup>2</sup> Good examples are the papers by Bertrand and Hallock (2001) and Wolfers (2006) on the performance of female CEOs relative to their male counterparts in the US.

<sup>3</sup> More recently, similar initiatives have been launched by other well-known academic societies like the European Economic Association and the Royal Economic Society.

<sup>4</sup> See, e.g., Hansen (1991), Kahn (1993, 1995), Blank (1996), McDowell, Singel and Ziliak (1999), Booth, Burton and Mumford (2000), Ginther and Kahn (2004), and the references therein.

higher is the share of female academic economists that join the field in that year. In the second study, the authors analyze whether the co-authorship pattern in articles published during 1991-2002 in three top Economics journals are gender neutral. Their main finding is that gender sorting in co-authorship increases in the presence of women.

Our paper extends this scant evidence in several ways. First, we have assembled a much larger database of researchers in distinguished economics departments and of journals than in the above-mentioned papers.<sup>5</sup> For that, we use data on researchers affiliated to institutions appearing in the list of rankings of the Econphd.net website ([www.econphd.net](http://www.econphd.net)), together with detailed information about how they were elaborated.<sup>6</sup> These rankings are among the most substantial in scope. Economics departments are ranked in an overall classification (*All Economics*) and in many (34) sub-fields, on the basis of the research quality of the publications of their faculties in 63 journals over roughly ten years, 1993-2003. Journal selection and quality adjustment are based on the citation analysis developed in Kalaitzidakis, Mamuneas and Stengos (2003). Using the rankings related to *All Economics*, we have selected faculty members in the top 50 departments (listed in the appendix), out of which 74% are North-American and the remaining 26% are European.<sup>7</sup> Secondly, through a detailed search on the websites of these departments, we have drawn information on the fields of specialization (using both JEL and Econphd.net codes) of their faculty members as well as on a range of personal characteristics, which again extend the ones used in the two above-mentioned studies. Although the nature of this data is purely cross-sectional- the data corresponds to the 2005 composition of

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<sup>5</sup> The choice of researchers in distinguished departments follows the nature of the dataset used in Hale (2005). The idea is to isolate highly competitive environments where overt discrimination is absent. Note that, although in general field choice typically occurs in the second or third year of graduate school, these initial choices may change over a researcher's career, as we document in section 2 where we discuss that academic economists often have more than one field of research.

<sup>6</sup> Launched in 2003, Econphd.net is now one of the best-known non-department websites in Economics. It is run at the University of Melbourne, Dept. of Economics, and the Economic Theory Centre.

<sup>7</sup> Out of the top 50 economics departments, 35 are based in the U.S., 13 in Europe (including Israel), and 2 in Canada.

departments- through this procedure, we are able to analyze somewhat the “dynamics” of the gender distribution by field for different age cohorts based upon the year of Ph.D. graduation.<sup>8</sup> Thirdly, by including some of the top European departments in our sample, we extend the previous evidence which is exclusively based on U.S. departments. Finally, we expand the set of hypotheses that can be tested in order to explain female field choices. Specifically, we claim that women’s under-representation in certain areas of economics cannot be explained by a single theory among the ones listed above. Instead, we speculate that a more plausible explanation could be based on a combination of these theories. More concretely, the fact that in the past women have generally perceived gender discrimination and segregation as key issues affecting their wellbeing, might have led the first cohorts of female Ph.Ds in economics to initially specialize on these issues (e.g., education, environmental, health and labour economics, income inequality, etc). Later, clustering of women-economists in specific fields may have arisen as long as: (i) their preferences for these fields persist, (ii) women avoid increasingly male-dominated fields, and (iii) men avoid increasingly female-dominated fields. Either of these explanations leads to the path-dependence hypothesis, yet in different forms. Also, one of them gives rise to another interesting hypothesis related to quality of fields, proxied by the number of articles published in top academic journals relative to all papers in each of the fields.

Our main findings can be summarized as follows. We confirm previous evidence on path dependence in women’s choices of fields. We find no evidence that men-economists avoid “female” fields tipping them to become even more “female”. By contrast, our evidence supports that women-economists prefer to work where other women worked previously. Further, we document how gender segregation by field has decreased slowly across cohorts, mainly due to the rise of the share of women in some fields where they were previously under-represented, rather than to changes in the weights of certain fields with less segregation. Finally, we show that the share of women in a field

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<sup>8</sup> It is very important to notice that the set of tenured faculty in these departments in 2005 is not a good representation of the set on tenure-track faculty in, say 1995, since a lot of junior faculty in top-50 schools do not get tenure and move to a lower-ranked school or elsewhere in the private or public sectors. Thus, there could be a large attrition bias in our sample that, unfortunately we cannot cope with since reconstructing the actual composition of these departments over more than 40 years is not a feasible task..

decreases with its quality. However, these patterns seem to be changing for the younger cohort of women-economists who graduated in the 1996-2005 decade.

The rest of the paper is organized as follows. Section 2 discusses how conventional and recent theories about discrimination and segregation can explain the main stylized facts of gender differences in the choice of research fields in economics, as well as draws several implications to be tested. Section 3 describes the new dataset used here and documents the salient facts about the distribution of men and women-economists across areas of specialization, including how gender segregation by field has evolved on the basis of Ph.D. cohorts. Section 4 presents econometric evidence about the previous implications based both on aggregate and individual data. Finally, Section 5 concludes. An Appendix with three sections offers a detailed description of the data (and some supplementary econometric results).

## **2. Theories about the field choices of women-economists**

There is an extensive empirical literature showing that large gender earnings differences prevail in competitive high-ranking positions (see, e.g. Blau and Kahn, 2000 and Albrecht, Bjorklund and Vroman, 2003). In parallel, there has been a new stream of studies documenting that the allocation of high-profile jobs remains largely favorable to men (see, e.g., Bertrand and Hallock, 2001, and Black and Strahan, 2001). Since academic positions are generally akin to this type of occupations – all requiring large human capital investments – the latter turns out to be most relevant for this paper. The fact that women are under-represented in high-profile jobs has been rationalized by a number of theories which can be broadly classified into five categories.

The first two explanations are quite well known. One rests on self-selection (see Polachek, 1981). The idea is that, even if one were to assume that the distribution of abilities is identical for men and women, the fact that the latter may face career interruptions (e.g., due to maternity leaves or some other family-care related issues) hampers their access and promotion prospects to those high-quality jobs. Thus, on the basis of expectations about these inactivity periods, women may self-select into lower profile jobs where, in contrast to top occupations, the penalty for career breaks is not so high. This theory has been used to explain gender differences across disciplines, e.g., in humanities and

engineering (see Borden et al., 2007) but it is difficult to think that it plays a significant role to explain such differences in the distribution across fields within a given discipline (economics). The other one relates to “Becker-type” taste discrimination in the workplace, leading to different treatment of men and women with equal productive skills and preferences as long as perfect competition does not prevail in product/labor markets (see, e.g. Goldin and Rouse, 2000, and Black and Strahan, 2001).

The third explanation is related to differences in preferences: women go into different jobs than men because they are genuinely interested in certain activities (preference persistence or, in short, PP). The fourth one relies on theories of segregation as a cause of social exclusion (SE, henceforth), mostly applied to ethnic groups. These theories predict the impossibility of an integrated equilibrium (hence, the dominance of a segregated equilibrium). They are inspired by Schelling’s (1971) and Loury’s (1977) arguments about how asymmetries in whites’ bias against living with blacks -relative to blacks’ bias against living with whites- can lead neighbourhoods to tip toward all Black, once the fraction of blacks exceeds a certain threshold. Applying this theory to the choice of research fields might mean that male researchers avoid fields if they get too female, or viceversa.

More recently, a related rationalization of the under-representation of women in high-skilled occupations has been proposed (see, Gneezy, Niederle and Rustichini, 2003 and 2004, Gneezy, Niederle and Rustichini (2003) and Babcock and Laschever, 2003) which may also play a role in the specific setup analyzed here. It relies upon arguments drawn from the psychology literature and the basic finding of experimental research on this issue is that is that women, selected to be equally competent as men, under-perform in mixed-gender groups relative to single female groups. Men’s performance, by contrast, does not significantly change between both types of groups. Hence, their main conclusion is that women only dislike competition when it is against men. In the sequel, this theory is labeled as *gender differences in competition* (GDC henceforth).<sup>9</sup> As a result, a man who is equally skilled than a woman may get a

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<sup>9</sup> Their experimental evidence confirms that, while there are no significant differences in men’s and women’s performances in noncompetitive environments (e.g., under a fixed-rate payment scheme for completing a given task in a given period), the average performance of men

higher chance of being successful in jobs which do not require an ability to compete, simply because of the gender differences in the attitude towards competing in the selection process.

Our prior belief is that, on their own, none of the previous explanations can be used to interpret the patterns of gender differences in the choice of research fields that we document below. Issues related to women's self-selection and taste discrimination for academic candidates competing for positions in top departments, with similar publication records (scores) and other valuable skills, should be much less relevant than in other segments of the labor market where meritocracy is not so strong. Consequently, it is very unlikely that women are driven by external factors (e.g., supervisors' advice to study some specific topics) in choosing different or "less demanding" fields than men. In such strong academic environment, meritocracy in terms of research excellence rules in the allocation of faculty positions and the promotion to tenured professorships, which takes place in tournament-type setup.

However, it is likely that in the past – when women started to represent a significant fraction of Ph.Ds in economics- (correct or incorrect) perceptions that discrimination and segregation were the most relevant issues affecting their gender pushed them towards these topics in order to propose efficient policies. Once the initial clustering of women-economists in gender/social fields, took place, latter cohorts of female Ph.Ds may have followed a similar choice pattern either because they keep common interests on the same gender problems- possibly insofar as they remain yet unsolved, as implied by *PP* - or because they dislike working on other topics where male researchers are predominant, or because men avoid choosing female fields, as predicted by the *GDC* and *SE* theories, respectively. This leads to the following testable hypothesis –split into three cases- concerning the behavior of women-economists:

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significantly increases relative to women's in competitive and uncertain environments (e.g., in winner-takes-it-all tournaments where the fixed-rate payoff scheme is replaced by another one where only the participant completing the largest number of tasks is paid proportionally to the output). Interestingly, however, it is also found that women have a higher chance of developing their skills and interests when shielded from competition with men. That is, the performance of women also increases relatively to noncompetitive setups when they compete only against women in single sex groups.

Hypothesis 1 (H1a): *Under PP, women will prefer certain fields because they are genuinely interested in them.*

(H1b): *Under SE, men will avoid fields where the fraction of women exceeds a certain threshold.*

(H1c): *Under GDC, women will prefer fields where other women have a significant presence.*

As will be discussed in section 4 below, H1a is akin to testing for persistence being solely explained by fixed effects in longitudinal models. By contrast, both H1b and H1c lead to *path dependence* (i.e., dependence of women's share in a field on past female share) after controlling for field effects, that is, independently of the fact that women may prefer some fields over others. This is the main hypothesis tested by that Hale (2005). Yet, the reasons behind path dependence differ between the two hypotheses. On the one hand, under SE, H1b states that, rather than women entering already female-dominated fields as under GDC, will be men those who avoid choosing these fields for a variety of motives. For example, they may (subjectively) feel that female fields are stigmatizing for men. Under either theory, however, the dynamics is toward more segregation by gender.

Additionally, it is important to notice that not all research fields may yield the same return in relation to the scores achieved by the researchers, leading to some uncertainty in the choice of fields. For example, publishing a paper in a fashionable/novel topic may have a higher return, in terms of prestige and tenure prospects, than publication of a paper in a more mature field (even in the same journals), since citations tend to be larger in the former case. Thus, if highly competitive men chose began doing economics research earlier than women and initially those fields with a higher chance of getting a good payoff, a direct prediction of the GDC theory would be that women-researchers would choose fields in which there are less men, with whom they feel uneasy to compete. Alternatively, SE theories predict that men would try to avoid female fields or viceversa, although it should be noticed the case where women avoid "male" topics is observationally equivalent to GDC. This leads to the following testable hypothesis:

Hypothesis 2 (H2): *Under GDC, there is a negative relationship between quality of a field and the share of women-researchers in that field.*

The three above-mentioned hypotheses will be tested in section 4.

### 3. Data description

Data are obtained from the personal web-pages of faculty members of the top-50 economics departments in the world as listed in Econphd.net (*All Economics* category) based on affiliations in the first term of 2005 (see Appendix A). In this fashion, we extracted information on 1876 individuals out of which 284 are women (15.1%). Using JEL codes, fields were assigned on the basis of the main bodies of published research and, in many instances, on self-reported information about main areas of interest. For some of the analysis, following Hale (2005) and Boschini and Sjögren (2007), we grouped the disaggregate JEL codes in 10 main fields, with the tenth one capturing “other fields” (“Other” in short).<sup>10</sup> However, in some other instances where less aggregation is more convenient, we use finer lists of either 20 or 34 fields for which Econphd.net offers information on the quality of publications (see Appendix B for the aggregation procedures). At this stage, it is important to stress that, in most cases, either researchers report more than one area of specialization or their publications fall into several different fields. Interestingly, on average, men and women report almost identically two fields of research (male avg. =1.88, female avg. =1.86).<sup>11</sup> Hence, in the sequel, we will refer to this unit of analysis as *Researcher-fields* (in short “Rfs.”) to differentiate it from individual researchers.

#### 3.1 Descriptive statistics and gender segregation by field

To document the gender distribution of Rfs. by area of research, Table 1 presents the results obtained for the 10 JEL fields in the coarser aggregation. Overall, our sample comprises 3666 Rfs., out of which 562 are female. This yields a share of 15.3% (=562/3666) i.e., a very close percentage to the 15.1% obtained when individuals (=284/1876) rather than Rfs. are considered.

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<sup>10</sup> We added Economic History to Hale’s (2005) nine fields because, in some universities, economic historians have their own department, different from the Economics department.

<sup>11</sup> Thus, even if they specialize in a single topic at the time of completing a Ph.D, they tend to diversify to other (related) topics once they interact with other colleagues.

Column (1) shows the total number Rfs. in which faculty members (assistant/lecturer, associate/reader and full professors)<sup>12</sup> are specialized, while column (2) reports the weight of each field, namely the fraction of the overall sample of Rfs. in a given field.<sup>13</sup> Thus, for example, Micro/Theory (17.2%), followed by “Other” (16.1%) are the highest populated fields, whilst International (6.5%) and Economic History (2.80%) are the least populated. Finally, column (3) displays the fractions of female Rfs. in each on the 10 fields. In this case, the two categories with the largest shares of women are Labor Economics (20.4%) and Public Economics (19.1%), whilst the ones with the lowest shares are Micro/Theory (12.0%) and “Other” (12.3%).

**Table 1**  
**Gender distribution by field**

Field	(1) Number of Rfs.	(2) Distribution of Rfs. (%)		(3) % of Females (un-weighted)	
		Un- weighted	Weighted	Un- weighted	Weighted
1 Econometrics	393	10.7	11.7	12.7	12.6
2. Micro/Theory	629	17.2	19.0	12.0	12.3
3. Macro	422	11.5	11.3	15.2	14.4
4. International	239	6.5	5.9	16.7	16.8
5. Public Econ.	366	10.0	9.6	19.1	20.1
6. Labor	338	9.2	9.4	20.4	20.2
7. I.O.	299	8.2	7.6	17.4	18.1
8. Growth/Dev.	285	7.8	6.9	16.8	18.5
9. Economic History	103	2.8	3.0	17.5	15.1
10. Other	592	16.1	15.6	12.3	11.4
<b>Total</b>	<b>3666</b>	<b>100.0</b>	<b>100.0</b>	<b>15.3</b>	<b>15.1</b>

Source: own elaboration from Econphd.net

For comparison with the 10-field aggregation procedure used so far, Figures 1a and b plot the proportion of women across fields, using more detailed lists of 20 (JEL) and 34 (Econphd) fields, respectively. Rfs. are used again as unit of measurement. The distribution of the fraction of women with these finer classifications is fairly similar to that presented in column (3) of Table 1. According to Figure 1a (20 fields), Health, Education & Welfare and Labor &

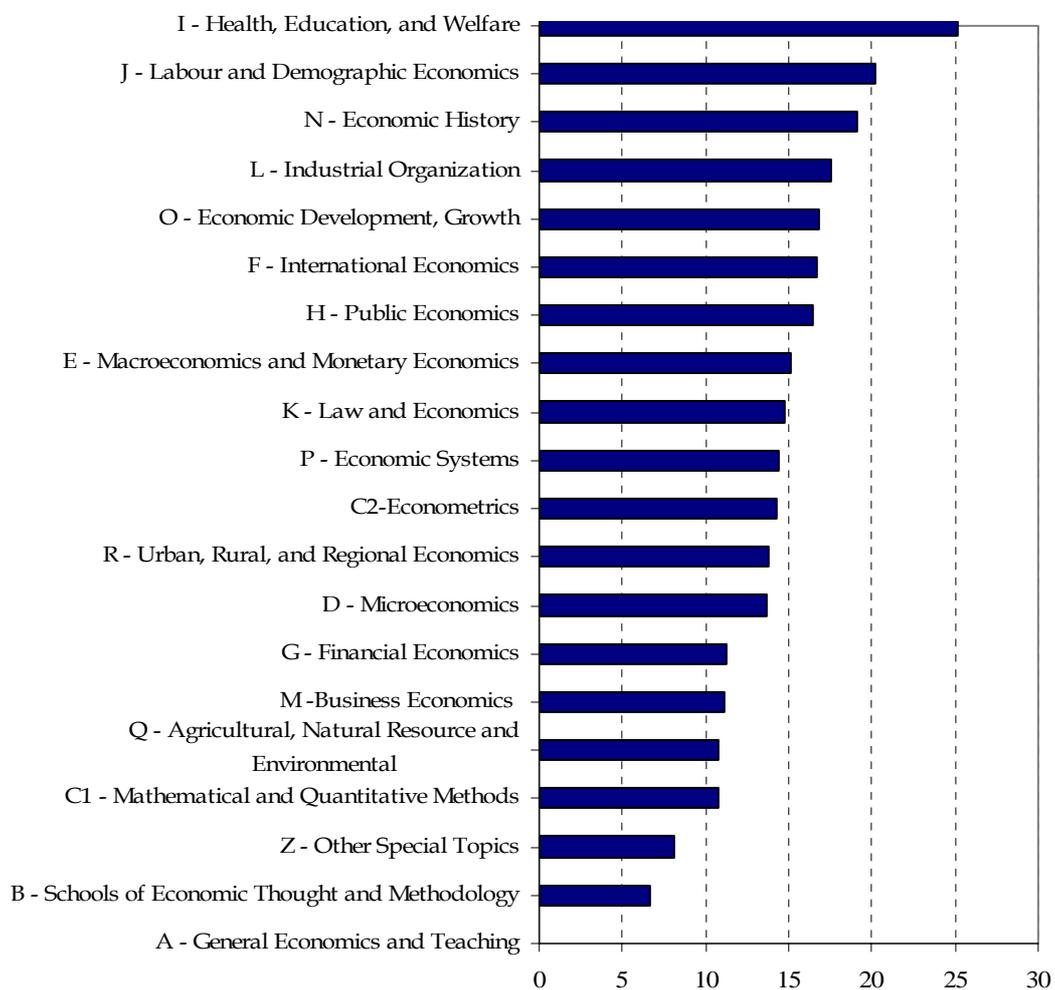
<sup>12</sup> Adjunct and visiting professors are excluded from our sample.

<sup>13</sup> Since Rfs. are used as unit of analysis, the distributions can be either computed giving each Rf. observation the same weight (un-weighted) or alternatively weighting the observation by the factor (1/# fields chosen by the researcher) (weighted).

Demographic Economics are the more popular among women (20-25%) while Mathematical Economics, Agricultural Economics and Other Special Topics are the less popular (below 10%). In Figure 1b (34 fields), Wages and Inequality (including Gender Discrimination), Education, Health and Demographics, Labor, and Social Choice and Public Goods, are at the top of female choices whereas Mathematical Economics, Fluctuations and Business Cycles and Agricultural Economics are at the bottom.

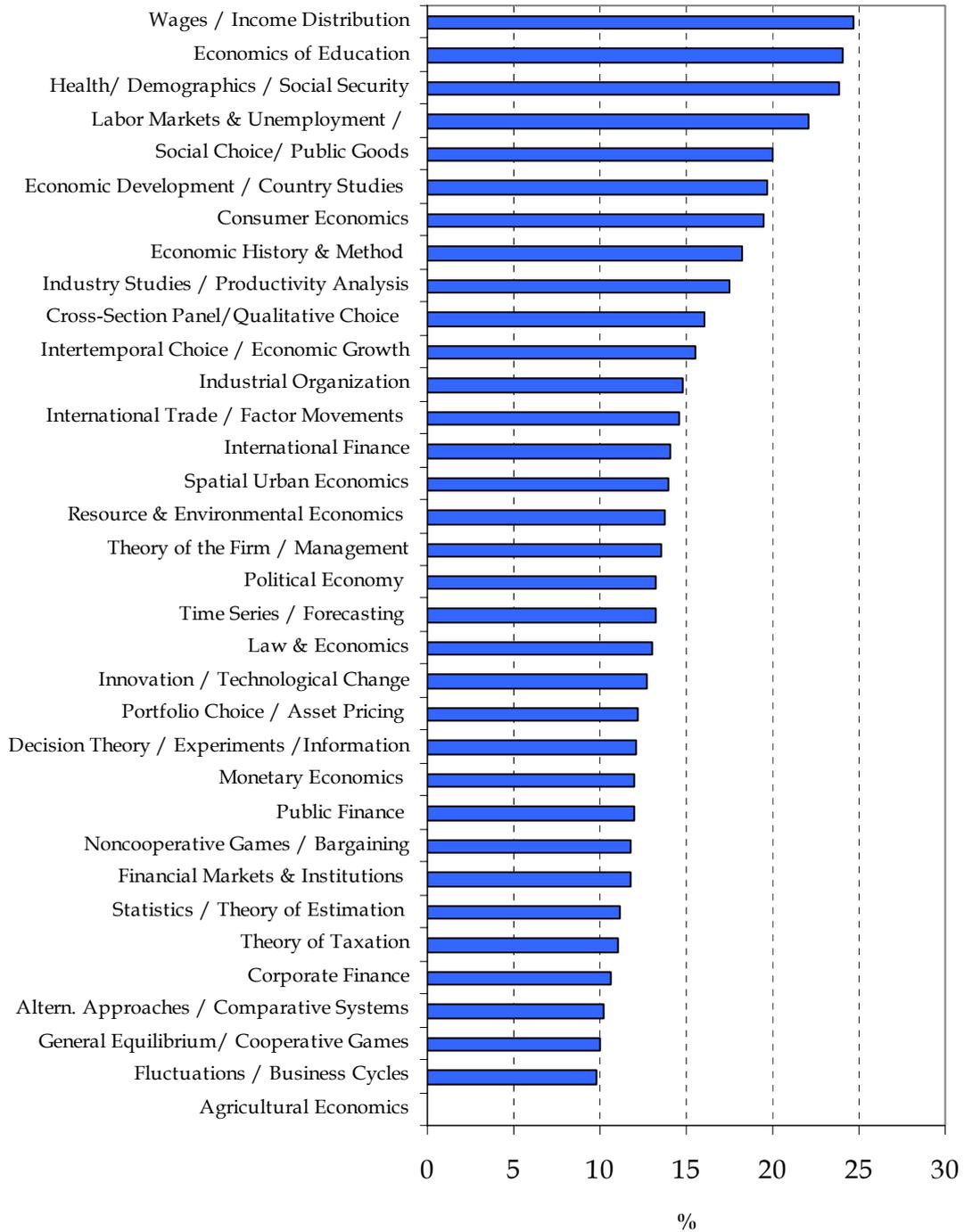
**Figure 1a**

Proportion of women in each field (20 fields)



**Figure 1b**

Proportion of women in each field (34 fields)



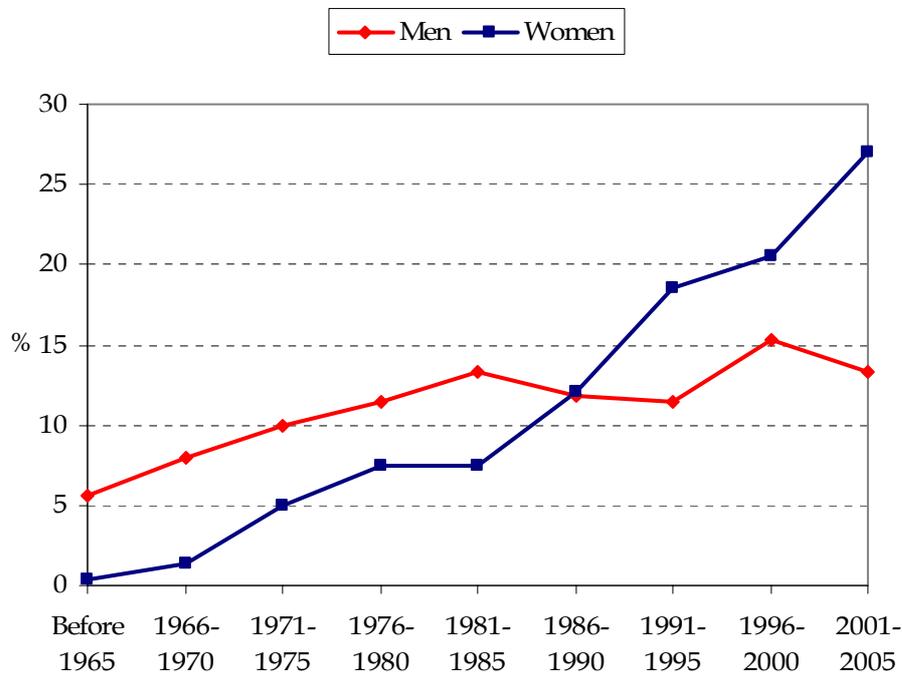
### 3.2. Ph.D cohorts

In this section, we analyze the distribution of researchers in our sample by gender and Ph.D cohort. The first issue we wish to address is whether the younger female economists in the top-50 departments are joining these departments at a higher rate than their older colleagues. We use year of Ph.D.

graduation as a proxy for age (usually not reported in the CVs). In this fashion, cohorts are defined in some instances in terms of 9 half-decade spells (the average duration of a thesis), and as 4 decade spells in other cases.<sup>14</sup>

Figure 2 shows the current distribution of researchers by Ph.D. cohorts, namely, the fraction that faculty members who graduated in a given cohort represent of the current size of the departments (as of 2005). Thus, for example, more than 25% of women-economists currently in these departments graduated in the last cohort (2001-2005) while less than 2% did in the cohort 1971-1975. Thus, there is a clear rise in the participation of women in the younger cohorts. By contrast, the distribution for men exhibits a much flatter slope, with a slight increase from 6% to less than 15%. Figure 3, in turn, displays the fraction of women graduating in these top-50 departments. It shows that almost 70% of women in our sample have completed their thesis after 1990. All this evidence points out that female graduates make a growing share of the supply of young researchers recruited by economics departments in the academic job market.

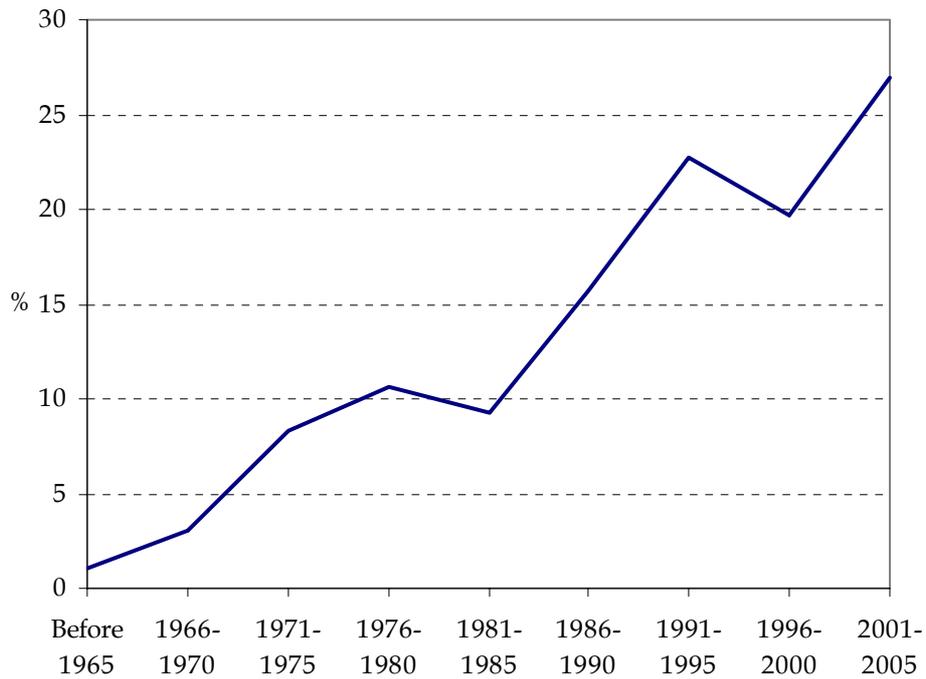
**Figure 2**  
Distribution of faculty members by Ph.D cohort and gender



<sup>14</sup> There are some cases in British universities whereas tenured professors did not complete a Ph.D. In those cases, we allocated them to the cohort in which they got their first job as Lecturers.

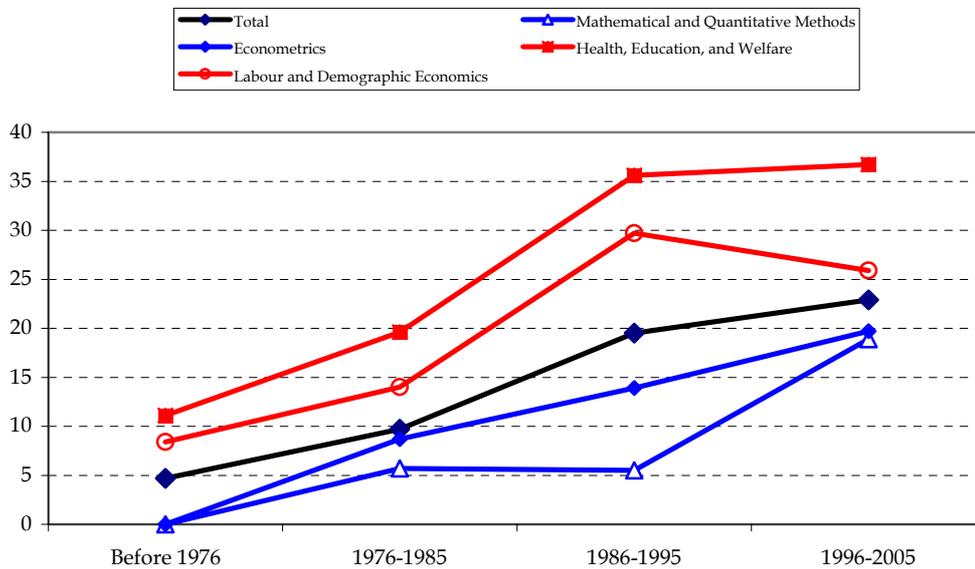
**Figure 3**

Proportion of female graduates by Ph.D. cohort



**Figure 4**

Share of women by field and cohort



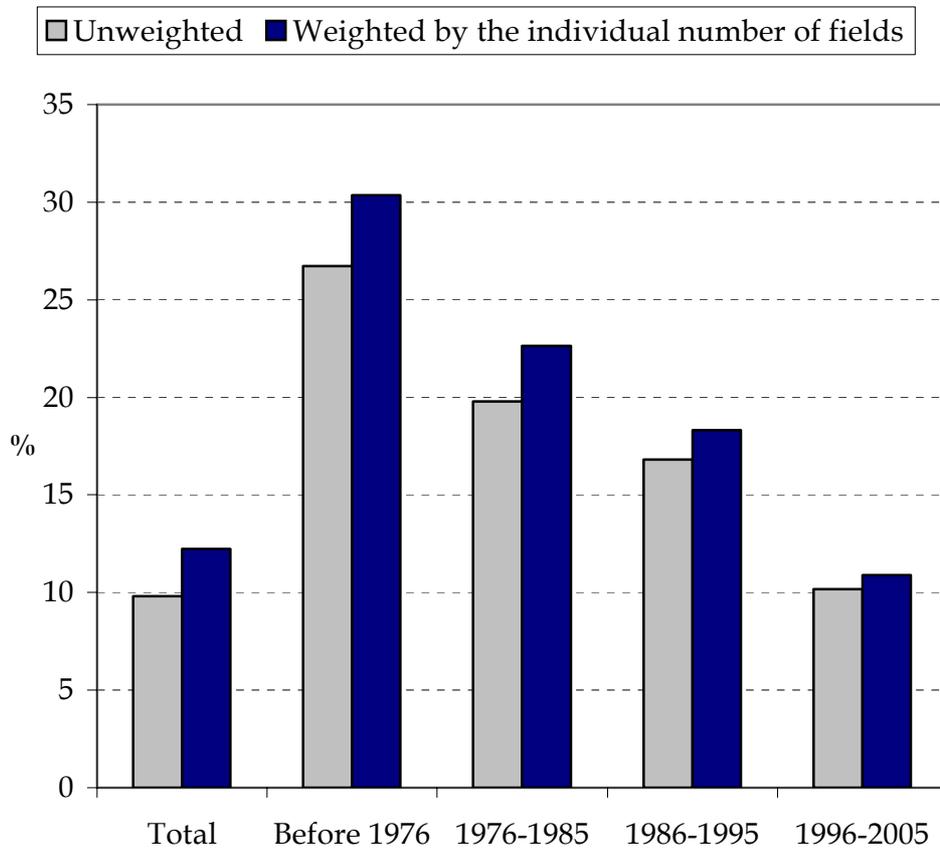
### 3.3 Changes in gender segregation by field

In the previous sections we have presented descriptive evidence documenting the advance of women in the top 50 departments. In order to explore the determinants of these changes, we provide here some new evidence about

the evolution of segregation by gender in the different fields. To do so, we use again four decade-cohorts.

Preliminary evidence on this issue can be obtained by computing the well-known Duncan and Duncan (1955) segregation index (S index, henceforth) across the different fields by cohort.<sup>15</sup> Figure 5 depicts its evolution for the 20-fields classification, computed both in its un-weighted (grey bars) and weighted (black bars) versions, for the overall sample (total bars) and for each of the four Ph.D. decade-cohorts.

**Figure 5**  
Segregation index by Ph.D. cohort



<sup>15</sup> The S index is defined as  $S_c = 0.5 \sum_i |m_{ic} - f_{ic}|$ , where  $m_{ic}$  ( $f_{ic}$ ) is the proportion of male (female) faculty members in field  $i$  for Ph.D. cohort  $c$ . This index, expressed as a percent, can be loosely interpreted as the proportion of women (men) who have to “trade” fields with a man (woman) for both sexes to be represented in all fields in proportion to their representation in the whole system. A value of 0% indicates that the distribution of men and women across fields is the same, while a value of 100% indicated that women and men work in completely different fields.

As can be inspected, roughly the same picture appears in either version of the S index: gender segregation by field is larger for the older cohorts. The decline in segregation with respect to the previous cohort is stronger for those who graduated in the cohorts 1976-1985 and 1996-2005. While for each of these two cohorts segregation fell by almost 7 percentage points, it only decreased by 3.5 p.p. for the intermediate 1986-1995 cohort. Both features are somewhat consistent with the evidence presented earlier in Figures 2 and 3 where the early 1990s was the only period in the sample where the steady rise in the shares of women completing a Ph.D. and/or becoming a faculty member experienced a slowdown. Hence, this preliminary evidence provides some support for lower segregation by field in younger female cohorts than in older cohorts, a hypothesis which will be further examined in section 4 below.

When all cohorts are pooled, the value of the overall S index is in the range 10-13%, depending on whether observations are weighted or not. This is a much lower value than the corresponding indexes reported by Dolado, Felgueroso and Jimeno (2001, 2004) for occupational gender segregation in the population with college education in the US (around 35%) and in the EU (around 38%). Following the increasing participation of female graduates in the academic labor market, this lower value yields some support to the view that the highly competitive environment in which academic research activities operate leads to a lower degree of segregation in these jobs than in alternative skilled occupations where high-educated women work.

Lastly, we analyze the extent to which the reported changes in segregation are due to genuine changes in the female preferences to work in certain fields, or to changes in the importance/weight of fields where they have traditionally worked. We follow Blau, Simpson and Anderson's (1998, BSA henceforth) decomposition method of the change in the S index over time, adapting it to our framework of cohorts. The decomposition yields a breakdown of the total change in the S index between two consecutive periods (cohorts in our case) into two effects: (i) a *sex composition effect* within fields, holding constant the weights of fields, and (ii) a *field weight effect* due to changes in the field mix, holding constant the sex composition within fields.

The BSA decomposition works as follows. Denoting by  $M_{ic}$  ( $F_{ic}$ ) the number of male (female) researchers in field  $i$  and cohort  $c$ , the female and male shares

by cohort and field are defined as  $p_{ic} = F_{ic} / (M_{ic} + F_{ic})$  and  $q_{ic} = M_{ic} / (M_{ic} + F_{ic})$ , respectively, whereas the field weight is defined as  $\alpha_{ic} = (M_{ic} + F_{ic}) / \sum_i (M_{ic} + F_{ic})$ . Aggregating over all fields, the S index for cohort c can be expressed as  $S_c = 0.5 \sum_i | (q_{ic} \alpha_{ic} / \sum q_{ic} \alpha_{ic}) - (p_{ic} \alpha_{ic} / \sum p_{ic} \alpha_{ic}) |$ . Let  $S_{cc'}$  denote the segregation index computed with female and male shares corresponding to cohort c and field weights corresponding to cohort c'. Then, using the notation c, c'=0, 1, where "1" denotes the younger Ph.D. cohort and "0" the older cohort, the difference between  $S_1$  and  $S_0$  (or  $S_{11}$  and  $S_{00}$  with this new notation) satisfies

$$S_1 - S_0 = (S_{10} - S_{00}) + (S_{11} - S_{10}). \quad (1)$$

The first term in the RHS of (1) captures changes due to the *sex composition effect* i.e., the change in the index between cohorts 1 and 0 that would have occurred if the weight of each field had remained fixed at its level for cohort 0, while the second term yields the *field weight effect* i.e., the change in the index if the gender shares had remained invariant at the level of cohort 1.

Table 2 displays the results of decomposition (1) across 20 and 34 fields, respectively, and four decade-cohorts. For illustrative purposes, Tables C1 and C2 in Appendix C present the gender shares and field weights used in the computation of the decomposition using 20 fields, as well as the corresponding contributions of each effect by field. Since the results with the un-weighted and weighted versions of the S index are similar, only results for the former are reported.

**Table 2**  
**BSA decomposition of changes in DDS index**

	1976-1985/before 1976			1986-1995/1976-1985			1996-2005/1986-1995		
	Sex comp	Field weight	Total	Sex comp	Field weight	Total	Sex comp	Field weight	Total
UDDS (20)	-4.4	-2.6	<b>-6.9</b>	-2.4	-0.6	<b>-3.0</b>	-6.1	-0.5	<b>-6.6</b>
WDDS (20)	-4.4	-3.4	<b>-7.7</b>	-4.1	-0.2	<b>-4.3</b>	-6.4	-1.0	<b>-7.4</b>
UDDS (34)	-6.2	-2.1	<b>-8.3</b>	-3.9	-0.2	<b>-4.1</b>	-6.8	-1.2	<b>-8.0</b>
WDDS (34)	-6.0	-2.5	<b>-8.5</b>	-4.0	-0.3	<b>-4.3</b>	-7.1	-1.3	<b>-8.4</b>

Note: UDDS and WDDS denote the un-weighted and weighted version of the DDS index; the numbers in parentheses are the number of fields.

The main conclusion to be drawn from Table 2 is that the contribution of the *sex composition* effect is much larger than that of the *field weight* effect. This is particularly the case for the two cohorts after 1986. By contrast, the relative

contribution of the two effects in explaining the change of segregation between the cohort 1976-85 and the previous one is much more balanced. Indeed, as can be observed in the right panel of Table A1, the field weights ( $\alpha_i$ 's) have remained fairly stable over the four cohorts -with the exceptions of Econometrics and Microeconomics which have increased by almost 4 percentage points. On the contrary, the left panel shows that female shares in many fields have undergone very relevant changes with a common upward trend. This is particularly the case of fields like Health, Education & Welfare, I.O., Business Economics, and Growth/Development where the female shares ( $p_i$ 's) have increased by more than 20 percentage points. Finally, as shown in Table A2, the differences in segregation between the two most recent cohorts (2005-1996 and 1995-1986) are mostly due to Labor Economics, and two core fields in research - such as Microeconomics and Math. and Quant. Methods- that traditionally had been strongly male-dominated fields (see Figure 1a).

#### 4. Econometric evidence

In order to test more formally the set of hypotheses posed in section 2, we use two alternative econometric approaches. The first one relies upon aggregating information at the levels of cohorts and fields, therefore ignoring the distribution of individual researchers across fields. The second one focuses on individual choices of fields.

##### 4.1 Aggregate analysis across cohorts and fields

We start by analyzing the aggregate determinants of the gender composition across fields and cohorts. The idea of is to regress the share of female Rfs. in each field (34) and half-decade cohorts (8), denoted by  $F_{fc}$ , on relevant covariates related to the various hypotheses discussed in section 2, controlling for field and cohort fixed effects. These variables are the proportion of females in a given field in *all* previous cohorts, denoted as  $F_{f,c-1}$  and the quality of a field ( $qual_{fc}$ ). This last variable is constructed as the ratio between the number of papers in a given field published in the list of 30 journals provided by Kalaitzidakis et al (2003, Table 2, using the weight in Table 1 for the quality of

journals) and the (weighted) number of Rfs. in that field and cohort.<sup>16</sup> Thus, this quality index will be equal to 1 if all the Rfs. in a given field get published in the list of journals and 0 if none gets published. The average quality is 0.273 and its s.d. is 0.251. Figure B1 in Appendix B plots that average quality scores across cohorts. Moreover, to test for possible differences between North-American and European institutions, we also include a dummy variable (NA) which takes a value of 1 for departments in US and Canada, and 0 otherwise.<sup>17</sup> Specifically, the estimated regression is

$$F_{fc} = \beta_f + \beta_c + \beta_1 * qual_{fc} + \beta_2 * F_{f,c-1} + \beta_3 NA + \varepsilon_{fc}, \quad (2)$$

where  $\beta_f$  and  $\beta_c$  are field and cohort fixed effects, and the error terms ( $\varepsilon_d$  and  $\varepsilon_f$ ) are assumed to be *i.i.d.* across cohorts/fields.<sup>18</sup> Accordingly, hypothesis H1a (PP) would imply that  $\beta_2 = 0$ , once we condition for field fixed effects. Conversely, either H1b (GDC) or H1c (SE) imply  $\beta_2 > 0$ . How to distinguish between these two last hypotheses will be discussed below in the next subsection. As regards H2, the female share in each field should be negatively related to the quality of the field, and therefore the relevant hypothesis to test is whether  $\beta_1 < 0$ . Given that the evidence in section 3.3 pointed out to a significant change of pattern during the last decade or so, we test for this change by including interaction terms of  $qual_{fc}$  and  $F_{f,c-1}$  with a cohort dummy variable, 1(96-05), which takes value 1 the last decade- cohort (1996-2005) and 0 otherwise.<sup>19</sup> Finally, to account for possible variations in the nature of fields (e.g., labour has got more psychological and sociological through time) we also

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<sup>16</sup> The journal weights in Table 1 of Kalaitzidakis et al. (2003) are derived for the decade 1993-2002. In the absence of similar weights for previous decades, we kept them fixed throughout all the half-decade cohorts, re-weighting them when a journal did not exist yet.

<sup>17</sup> This dummy variable may also capture different affirmative action efforts across the two continents in the recruiting of women.

<sup>18</sup> A potential problem with the linear specification in (2) is that the dependent variable is between 0 and 1. To check how important this problem was, we also estimated a tobit regression model with both right and left censoring allowing for random effects (field fixed effects would lead to incidental parameters problem; cf. Greene, 2004). The results, not reported for the sake of brevity, were qualitatively similar.

<sup>19</sup> A dummy intercept for 1996-05 is also included.

estimate specifications of (3) augmented with interactions of the field and cohort fixed effects.

**Table 3**  
**Determinants of female shares by fields and Ph.D. cohort**

Variables	(1)	(2)	(3)	(4)
<b>Qual<sub>fc</sub></b>	-0.005** (0.002)	-0.009** (0.004)	-0.004** (0.002)	-0.006** (0.003)
<b>Qual<sub>fc</sub>*1<sub>(96-05)</sub></b>	---	0.006* (0.004)	---	0.002** (0.001)
<b>F<sub>f,c-1</sub></b>	0.547*** (0.068)	0.652*** (0.068)	0.489 ** (0.072)	0.589 ** (0.082)
<b>F<sub>f,c-1</sub>*1<sub>(96-05)</sub></b>	---	-0.234*** (0.102)	---	-0.276 ** (0.137)
<b>NA</b>	0.012 (0.007)	0.009 (0.008)	0.011 (0.008)	0.0010 (0.009)
<b>Field FE</b>	YES	YES	YES	YES
<b>Cohort FE</b>	YES	YES	YES	YES
<b>Field*Coh. FE</b>	NO	NO	YES	YES
No. Obs.	272	272	272	272
Pseudo R <sup>2</sup>	0.199	0.253	0.228	0.275

Note: Asterisks denote level of significance: \* 10%, \*\* 5%, \*\*\* 1%: FE=fixed effects

Column (1) in Table 3 reports the estimated coefficients in regression (3) without any interaction terms. We find strongly significant effects of the *quality* of the field and the share of women in a field in previous cohorts on the corresponding fraction of women. The higher is the quality of a field, the lower is that fraction, so that a rise of the quality of a field in one s.e. (0.251 p.p.) leads to a decrease in the female share of almost 0.2 p.p. Likewise, an increase of 1 p.p. in the past share of women in a given fields gives rise to a rise of 0.55 p.p. in the current female share. Hence, H1 (b and c) and H2 receives some support since we are controlling for fixed effects. As regards the NA dummy, we find a positive estimated coefficient, yet only significant at 15% level (t-ratio=1.5) yielding somewhat weak evidence that, *ceteris paribus*, females shares are higher in North-America than in Europe. Column (2) presents results with the interaction terms for the last cohort. As it can be inspected, there is a reduction in two above-mentioned effects, particularly in  $\beta_3$ . Columns (3) reports results including the interaction between the fixed effects for fields and cohorts.

Although the size and statistical significance remains lower than before, the qualitative results remain unaltered.

#### 4.2 GDC vs. SE

To distinguish between hypotheses H1b and H1c, we use a negative binomial, fixed-effects regression model (Cameron and Triverdi, 1998). For the former hypothesis, the dependent variable is the (logged) number of men getting doctorates in each field and in each cohort ( $\#MD_{fc}$ ) while the main explanatory variable is a quadratic polynomial in the fraction of females getting doctorates in a given field ( $FD_{fc-1}$ ) in previous cohorts. It is assumed that  $\#MD_{fc}$  has a negative binomial distribution with expected value  $\mu_{fc}$  and a variance given by  $\mu_{fc}(1+\theta\mu_{fc})$  where  $\theta$  is the over-dispersion parameter (the case when  $\theta=0$  corresponds to the Poisson distribution). In turn, the expected value  $\mu_{fc}$  is assumed to be a log-linear function of explanatory variables ( $\mathbf{x}_{fc}$ ), such that  $\ln \mu_{fc} = \delta_f + \beta' \mathbf{x}_{fc}$  where  $\delta_f$  is an intercept specific to each field, implicitly controlling for all stable characteristics of each field. The model also includes field and cohort dummies plus the total number on male doctorates in all fields as an “offset” term. Besides  $FD_{fc-1}$ , its square,  $FD_{fc-1}^2$ , is also included in order to check whether a quadratic shape yields thresholds of feminization of a field beyond which men move to another field, as the SE theory would predict. As for H1c, in the spirit of the GDC hypothesis, a similar model has been estimated for the (log of the) number of women getting doctorates in any given field ( $\#FD_{fc}$ ) where now the main control is the same as before, i.e., a quadratic in  $FD_{fc-1}$ , rather than in the share of men, since according to GDC, women chose fields where women are already working. The existence of an increasing and concave function in  $FD_{fc-1}$  would imply that, once the female share exceeds a certain threshold, women may start quitting these female-oriented fields.

The number of observations is 254, after eliminating those in which no Ph.D. degrees were awarded to women in a given field and the initial half-decade cohort. Table 4 presents the estimated coefficients for the two key explanatory variables (the estimates of  $\theta$  are 0.29 and 0.36, respectively, being significantly different from  $\theta=0$  at  $p=0.05$ ). The most interesting result is that the coefficients are not significant for men- therefore, contradicting H1b- while they are significant and yield an inverted U-shape shape for women, pointing out to path dependence generated by *GDC*. Indeed, simple calculations from the coefficients in this case show that, when the percent female of the field exceeds

22%, additional increments deter women's entry. In sum, these results seemingly support H1c relative to H1b.

**Table 4**  
**Fixed-Effects Negative Binomial regression models**

Dependent vr.	Explanatory vrs.	
	Prop. Female	Prop. Female Squared
Male Ph.D.s. (#MD <sub>fc</sub> )	-0.545 (0.443)	1.343 (0.916)
Female Ph.D.s. (#FD <sub>fc</sub> )	1.165*** (0.453)	-2.638*** (0.944)

Note: Asterisks denote level of significance: \* 10%, \*\* 5%, \*\*\* 1%;  
All models include dummy variables for fields, cohorts and either #of male or female doctorates in all fields, consistent with the dependent variable.

### 4.3 Multinomial logit for individual field choices

In this section, we report evidence about the modeling of the probability that an individual chooses a given field. The most natural framework would be a multinomial logit where each individual entering the economics profession has a choice of the field and one could check if this choice is affected by the share of women already in that field or its quality. However, given that there is more than one field choice per researcher, this is not feasible. To avoid this hindrance, we resort to estimating these models for individual researchers rather than using Rfs. To do so, we identify the main field for each of the 1876 individuals in our sample as the field in which they have more papers. In principle we chose the 34 fields of the Econphd.net classification. However, due to the small number of women and the large number of fields, the multinomial logit has a problem in identifying separate effects for each field. This difficulty is smaller when using the coarser list of 10 JEL fields (see Table B1 in Appendix B). Hence, the results reported below are restricted to these 10 fields. The specification we consider is

$$P_{ifc} = \lambda' x_{ifc} + \delta_0 \text{qual}_{fc} + \delta_1 \text{qual}_{fc} * \mathbf{1}(\text{fem}) + \delta_2 \text{qual}_{fc} * \mathbf{1}(\text{fem}) * \mathbf{1}(96-05) + \theta_0 F_{fc} + \theta_1 F_{fc} * \mathbf{1}(\text{fem}) + \theta_2 F_{fc} * \mathbf{1}(\text{fem}) * \mathbf{1}(96-05) + \varepsilon_{ifc}, \quad (3)$$

where  $P_{ifc}$  is the probability that an individual  $i$  in cohort  $c$  chooses field  $f$ ;  $x_{ifc}$  is a vector of individual-specific covariates which includes a gender dummy ( $\text{fem}=1$ ), a step dummy for 1996-2005, dummies for departments where they

graduated and where they work, and cohort and field dummies, plus their interaction. As in the aggregate specification (2), the female and last cohort dummies have been interacted with the female shares and field quality score.

**Table 5**  
**Determinants of field choices (marginal effects, multinomial logit)**

Field/Variables	Quality of field f. ( $\delta_0$ )	Qual. of field f x $\mathbf{1}(\text{female})$ . ( $\delta_1$ )	Qual. of field f x $\mathbf{1}(\text{fem}) \times \mathbf{1}$ (96-05) ( $\delta_2$ )	% of female in field f ( $\theta_0$ )	% of female in field f x $\mathbf{1}(\text{female})$ . ( $\theta_1$ )	% of female in field f x $\mathbf{1}(\text{fem}) \times \mathbf{1}$ (96-05). ( $\theta_2$ )	No. obs./ PseudoR <sup>2</sup>
1. Econ. History	0.011 (0.008)	-0.015 (0.010)	0.004** (0.002)	-0.113* (0.065)	0.179* (0.099)	-0.049*** (0.099)	1876/ 0.233
2. Econometrics	0.012** (0.006)	-0.019*** (0.008)	0.003** (0.002)	-0.158** (0.079)	0.292*** (0.109)	-0.038* (0.037)	1876/ 0.345
3. Micro/ Theory	0.028*** (0.012)	-0.034** (0.017)	0.005*** (0.002)	-0.182*** (0.058)	0.320*** (0.138)	-0.082*** (0.028)	1876/ 0.378
4. Labor	-0.012 (0.009)	0.004 (0.005)	0.005*** (0.002)	-0.149* (0.081)	0.277** (0.131)	-0.152** (0.071)	1876/ 0.287
5. I.O.	0.006*** (0.002)	-0.009* (0.005)	0.006* (0.004)	-0.086 (0.097)	0.177** (0.080)	-0.102*** (0.036)	1876/ 0.267
6. Public Econ.	0.008 (0.006)	-0.005*** (0.002)	0.001* (0.000)	-0.019 (0.016)	0.168*** (0.054)	-0.062*** (0.164)	1876/ 0.301
7. Macro.	0.004** (0.002)	-0.016** (0.007)	0.006*** (0.032)	-0.214*** (0.037)	0.365*** (0.117)	-0.046 (0.032)	1876/ 0.321
8. Growth/Dev.	0.015** (0.007)	-0.028* (0.005)	0.104*** (0.034)	-0.087 (0.084)	0.109* (0.059)	0.028 (0.042)	1876/ 0.286
9. Int. Econ.	0.008*** (0.003)	-0.006* (0.004)	0.099*** (0.003)	-0.081 (0.069)	0.126* (0.069)	-0.038* (0.021)	1876/ 0.259
10. Other.	0.004** (0.002)	-0.015*** (0.006)	0.060*** (0.027)	-0.077 (0.084)	0.169** (0.084)	0.034* (0.020)	1876/ 0.372

Note: Asterisks denote level of significance: \* 10%, \*\* 5%, \*\*\* 1% Other covariates: gender dummy, 1996-2005 dummy, graduation and current department dummies, cohort and field dummies and their interaction..

Thus, positive coefficients ( $\theta_1$ ) on the first interaction term concerning  $F_{fc}$  will provide indication that women care more than men about the share of female researchers working in a specific field, in accord with the path dependence hypothesis. Likewise, a negative sign of the coefficients on the second double

interaction term ( $\theta_2$ ) will indicate that path dependence decreases for the youngest female cohort. Similar arguments for  $qual_{fc}$ , albeit with  $\delta_1 < 0$  and  $\delta_2 > 0$ , would yield support to H2 and a weaker effect for the members of the last cohort.

The results regarding the  $\theta$ 's and  $\delta$ 's coefficients are reported in Table 5 in the form of marginal effects evaluated at the means. The coefficients on the field-quality score ( $\delta_1$ ) are generally positive. By contrast, the coefficients on the interaction term with the female dummy ( $\delta_2$ ) are mostly negative and especially significant for Econometrics, Micro/Theory and Macro. Yet, the coefficient on the triple interaction ( $\delta_3$ ) switches again to being positive. For example, in Econometrics, an increase of 1 unit in its quality score (from an average of 57.1% to 58.1%), lowers the probability of women doing research in that field in 0.007 (0.012-0.019), yet only in 0.004 (0.012-0.019+0.003) if they belong to the youngest cohort. As regards the share of women in a field, the positive estimated coefficients on the first interaction term ( $\theta_1$ ) supports path dependence in the majority of fields where the proportion of women is higher (see Table 1). By contrast, the coefficients on the second interaction term ( $\theta_2$ ) are mostly negative.

## 5. Conclusions

In this paper, we have drawn some implications from various theories of segregation in order to explain gender differences in the distribution of research fields among academic economists. For that, we have assembled a new database containing detailed information about fields of specialization and other characteristics of the current faculty members of the top-50 economics departments in the world, according to the rankings on the Econphd.net website.

We document that there are large difference between men and women-economists in terms of research field choices. Besides identifying "female" fields, we analyze how gender segregation by field has evolved across Ph.D. cohorts. Evidence is provided in favor of path-dependence in female choices, namely, the probability that a woman-economist chooses a given field is positively related to the share of women in that field. We find some support for women-economists avoiding male-dominated fields and reject that men-economists avoid female-oriented fields. Furthermore, the female fraction in a

given field is negatively related to an index of field quality of the field, proxied by the proportion of papers in that field published in highly prestigious journals. There is also evidence, however, that the previous results are much weaker for recent cohorts and that the gender gaps are slowly narrowing in many fields. All these results have to be taken with caution since they are based on 2005 cross-sectional data, thereby ignoring mobility of academics across other departments not included in our sample or out of the academia.

Many interesting questions remain. For example: *why does gender segregation of fields decline for the younger cohorts?*. None of the previous theories (PP, SE and GDC) predicts this outcome. The only theory that would explain this feature is the existence of some sort of Becker *discrimination* which we thought it was unlikely in top schools where meritocracy rules. Maybe that was not the case across all cohorts and increasing competition in the academic world has led to lower gender discrimination. Yet, this is only a conjecture. Also, it would be interesting to know directly from the faculty members in our sample which factors led them to choose a specific research field. With this goal in mind, we have distributed a questionnaire to a matched sample (by cohort and departments) of men and women asking them about various reasons behind their choices (e.g., genuine social interest, expectations of academic or economic success, specialization of the department of origin, etc.) as well as some family circumstances at the time of completing their Ph.D. dissertations (civil status, number of children if any, etc.). We received replies from 125 female professors (i.e. 44% of our sample of women) and 122 male professors. Although, analyzing how this information relates to the evidence presented earlier is in our current research agenda, we can report a rather striking result: whereas 50% of women who graduated before 1976 chose a field for its “social interest” (32.0% for men), this share has fallen to 33% (23.7% for men) for those who graduated between 1996 and 2005. These responses seemingly agree with our explanation of female initial choices and the subsequent evolution towards less segregation.

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## Appendix A

### List Top 50 academic institutions (Econphd.net), % of female faculty members and quality index in 2005

	<b>Department</b>	<b>Size</b>	<b>% of women</b>	<b>Qual.</b>
1	Harvard University	52	15.4	210.7
2	University Chicago	28	14.3	159.3
3	Massachusetts Institute of Technology (MIT)	36	11.1	136.8
4	University California - Berkeley	62	12.9	134.9
5	Princeton University	58	16.7	118.3
6	Stanford University	39	7.7	114.3
7	Northwestern University	46	17.4	112.9
8	University Pennsylvania	30	10.0	110.9
9	Yale University	45	15.6	108.9
10	New York University	42	7.1	105.1
11	University California - Los Angeles	48	20.8	94.9
12	London School of Economics (LSE)	56	16.1	94.9
13	Columbia University	39	15.4	93.2
14	University Wisconsin - Madison	35	17.6	69.5
15	Cornell University	34	14.7	68.6
16	University Michigan - Ann Arbor	65	21.5	68.0
17	University Maryland - College Park	37	16.2	67.4
18	University Toulouse I (Sciences Sociales)	48	10.4	65.3
19	University Texas - Austin	39	10.3	62.1
20	University British Columbia	30	13.3	61.6
21	University California - San Diego	37	21.6	61.4
22	University Rochester	24	17.4	58.0
23	Ohio State University	39	10.3	57.7
24	Tilburg University	44	9.1	56.8
25	University Illinois ( Urbana-Champaign)	38	7.9	56.6
26	Boston University	31	9.7	56.0
27	Brown University	29	10.3	52.8
28	University California - Davis	28	25.0	49.3
29	University Minnesota	25	20.0	48.8
30	Tel Aviv University	24	8.3	48.0
31	Oxford University	58	17.2	47.8
32	University Southern California	23	8.7	46.7
33	Michigan State University	37	21.6	45.1
34	Warwick University	47	19.1	44.8
35	Duke University	35	14.3	43.8
36	University Toronto	59	15.3	42.5
37	University Amsterdam	32	21.9	42.0
38	Penn State University	27	22.2	41.9
39	University Cambridge	42	23.8	38.6
40	Carnegie Mellon University	38	15.8	38.0
41	University North Carolina - Chapel Hill	31	12.9	37.8
42	Boston College	28	17.9	37.3
43	California Institute of Technology (Caltech)	16	12.5	37.3
44	Texas A&M University	34	17.6	37.0
45	European University Institute	12	0.0	36.0
46	University Carlos III Madrid	38	16.7	35.7
47	University College London	35	8.6	35.3
48	University Essex	39	25.6	34.8
49	Indiana University	32	15.6	34.2
50	Hebrew University	25	0.0	33.9

## Appendix B

\* The 10 fields chosen here correspond to the following aggregations of JEL codes:

Econometrics: C1 to C5, and C8,

Micro/ Theory: C0, C6, C7, C9 and D

Macro: E

International: F

Public: H

Labor: J

I/O: L

Dev/ Growth: O

Econ. History: B and N

Other: A (General Economics and Teaching), G (Financial Economics), I (Health, Education and Welfare), K (Law and Economics), M (Business Economics), Q (Agricultural Economics), R (Urban and Regional Economics), and Z (Other Special Topics)

\* The 20 fields correspond to the 19 main descriptors in JEL, where descriptor C has been disaggregated into C(1) (Mathematical and Quantitative Methods, and Game Theory) and C(2) (Econometrics, Programming and Data Collection)

\* The 34 fields correspond to the descriptors in Econphd.net where there is an index of quality of publications. In terms of JEL descriptors they are defined as follows.

1. Economic History & Method (A, B00-B49,N)
2. Alternative Approaches / Comparative Systems (B50-B59, P00-P59)
3. Statistics / Theory of Estimation (C00, C10-C16, C19, C20, C30, C40-C41, C44-C45, C49)
4. Cross Section, Panel, Qualitative Choice Models (C21, C23-C29, C31, C33-C39, C42-C43, C50-C52, C59, C80-C89)
5. Time Series / Forecasting (C22, C32, C53)
6. General Equilibrium Theory / Cooperative Games / Mathematical & Comp. Economics (C60-C63, C65, C67-C69, C71, D50-D52, D57-D59, D84)
7. Noncooperative Games / Bargaining & Matching (C70, C72-C73, C78-C79, D83)
8. Decision Theory / Experiments/Information Economics (C90-C93, C99, D00, D80-D82, D89)
9. Consumer Economics (D10-D12, D14, D18-D19, Z00, Z10-Z13)
10. Labor Markets & Unemployment / Working Conditions / Industrial Relations (D13, J20-J23, J28-J29, J32-J33, J40-J45, J48-J49, J50-J54, J58-J59, J60-J65, J68-J69, J80-J83, J88-J89, M50-M55, M59)
11. Wages / Income Distribution (D30-D31, D33, D39, J15-J16, J30-J31, J38-J39, J70-J71, J78-J79)

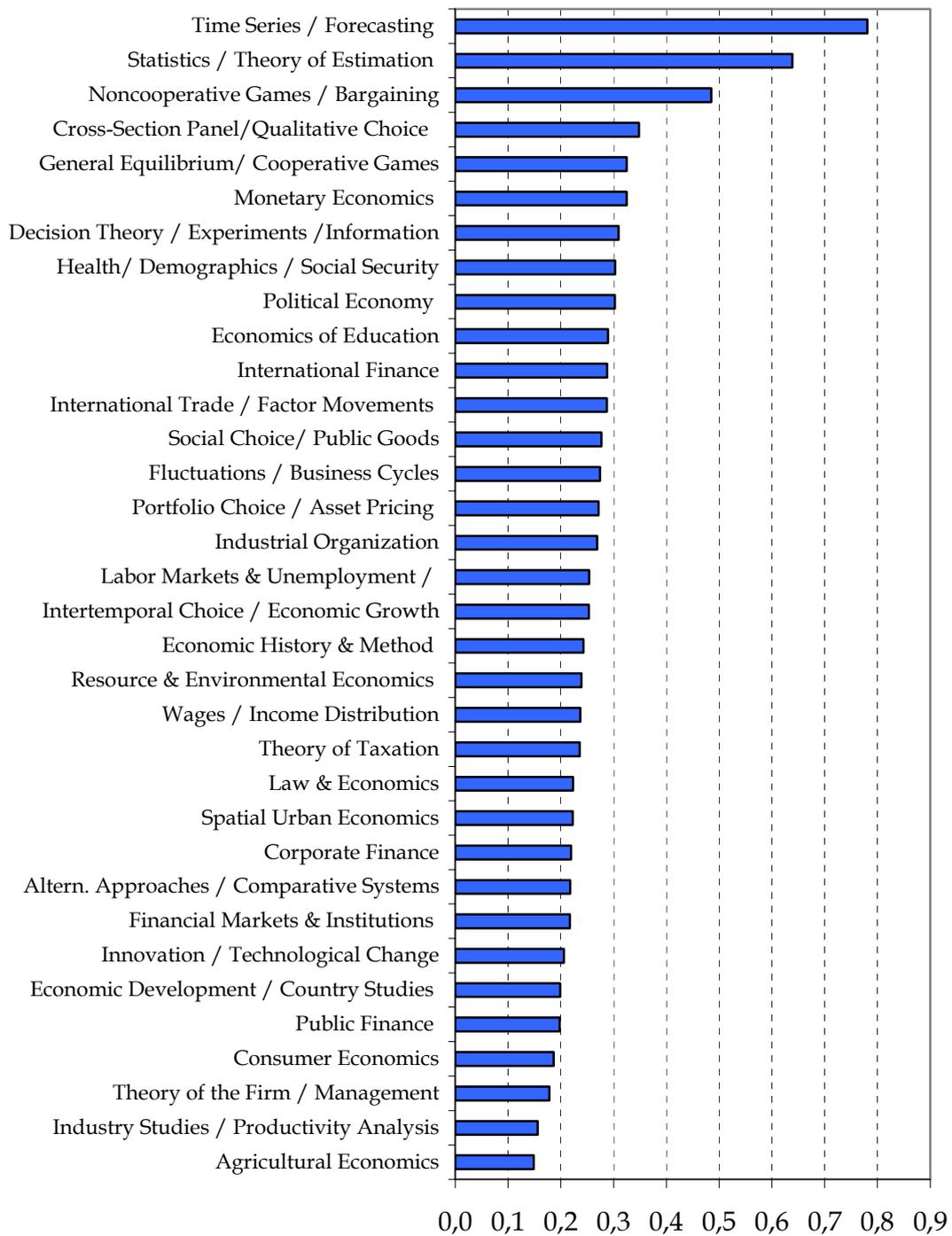
12. Health Care / Demographics / Social Security (I00, I10-I12, I18-I19, I30-I32, I38-I39, J00, J10-J14, J17-J19, J26)
13. Economics of Education (I20-I22, I28-I29, J24)
14. Theory of the Firm / Management (D20-D21, D23, D29, L20-L25, L29, L30-L33, L39, M00, M10-M14, M19, M20-M21, M29, M30-M31, M37, M39, M40-M42, M49)
15. Industry Studies / Productivity Analysis (D24, L60-L69, L70-L74, L79, L80-L86, L89, L90-L99)
16. Industrial Organization (D40-D46, D49, L00, L10-L16, L19, L40-L44, L49, L50-L52, L59)
17. Innovation / Technological Change (O30-O34, O38-O39)
18. Social Choice Theory / Allocative Efficiency / Public Goods (D60-D64, D69, D70-D71, H00, H40-H43, H49)
19. Political Economy (D72-D74, D78-D79, H10-H11, H19)
20. Theory of Taxation (H20-H26, H29, H30-H32, H39)
21. Law & Economics (K00, K10-K14, K19, K20-K23, K29, K30-K34, K39, K40-K42, K49)
22. Intertemporal Choice /Economic Growth (D90-D92, D99, E20-E21, F40, F43, F47, F49, O40-O42, O47, O49)
23. Fluctuations / Business Cycles (E00, E10-E13, E17, E19, E22-25, E27, E29, E30-32, E37, E39)
24. Monetary Economics (E40-E44, E47, E49, E50-E53, E58-E59)
25. Public Finance (E60-E66, E69, H50-H57, H59, H60-H63, H69, H70-H74, H77, H79, H80-H82, H87, H89)
26. International Finance (F30-F36, F39, F41-F42)
27. International Trade / Factor Movements (F00-F02, F10-F19, F20-F23, F299)
28. Economic Development / Country Studies (O00, O10-O19, O20-O24, O29, O50-O57)
29. Spatial, Urban Economics (R00, R10-R15, R19, R20-R23, R29, R30-R34, R38-R39, R40-R42, R48-R49, R50-R53, R58-R59)
30. Financial Markets & Institutions (G00, G10, G14-G15, G18-G19, G20-G24, G28-G29)
31. Portfolio Choice / Asset Pricing (G11-G13)
32. Corporate Finance (G30-G35, G38-G39)
33. Resource & Environmental Economics (Q00-Q01, Q20-Q21, Q24-Q26, Q28-Q29, Q30-Q33, Q38-Q39, Q40-Q43, Q48-Q49)
34. Agricultural Economics (Q10-Q19, Q22-Q23)

**Table B. 1: Gender distribution by field (individual researchers)**

Field	# of Research.	Gender	
		W (%)	M (%)
1 Econometrics	186	9.2	90.8
2. Micro/Theory	382	4.2	95.8
3. Macro	193	5.5	94.5
4. International	131	4.5	95.5
5. Public Econ.	167	11.2	89.8
6. Labor	131	17.2	82.8
7. I.O.	146	14.3	85.7
8. Growth/Dev.	137	7.8	92.2
9. Economic History	56	12.8	87.2
10. Other	342	13.3	86.7
<b>Total</b>	<b>1876</b>	<b>284</b>	<b>1592</b>

Source: own elaboration from Econphd.net

**Figure B.1: Field quality scores (average across cohorts)**



## Appendix C

**Table C-1**  
**Proportion of women in each field and field size weight, by Ph.D. cohorts**  
 (Individual weights: 1/no. of fields)

	$p_i$ = share of women in each field					$\alpha_i$ = field size weight				
	Total	Before 1976	1976- 1985	1986- 1995	1996- 2005	Total	Before 1976	1976- 1985	1986- 1995	1996- 2005
<b>Total</b>	<b>15.1</b>	<b>4.7</b>	<b>9.7</b>	<b>19.5</b>	<b>22.9</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
A - General Economics and Teaching	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.0	0.1	0.1
B - Schools of Economic Thought and Method.	4.3	7.0	0.0	0.0	0.0	0.3	0.9	0.2	0.1	0.2
C1 - Mathematical and Quantitative Methods	10.1	0.0	5.7	5.5	18.9	6.8	3.5	7.6	7.2	8.3
C2-Econometrics	12.6	0.0	8.7	13.9	19.7	11.6	8.9	10.1	13.0	13.7
D - Microeconomics	13.6	3.4	7.1	14.2	22.6	12.6	9.7	13.5	13.6	13.3
E - Macroeconomics and Monetary Economics	14.3	5.2	7.6	19.4	20.0	11.3	10.6	10.8	10.6	12.6
F - International Economics	16.9	6.5	4.4	26.7	26.7	5.8	6.7	5.4	5.5	5.9
G - Financial Economics	11.1	2.8	6.9	18.7	12.8	5.3	4.5	5.8	5.8	5.0
H - Public Economics	16.2	3.9	9.6	31.5	21.9	5.7	6.4	6.4	4.7	5.6
I - Health, Education, and Welfare	25.5	11.1	19.6	35.6	36.7	4.0	5.2	3.6	4.5	3.1
J - Labour and Demographic Economics	20.0	8.4	14.0	29.7	25.9	9.2	11.1	7.9	8.8	9.3
K - Law and Economics	13.2	8.0	5.5	22.4	23.6	1.3	2.6	1.1	1.2	0.6
L - Industrial Organization	18.4	2.3	14.4	19.7	26.6	7.3	5.4	7.2	7.4	8.6
M -Business Economics	12.6	2.0	4.1	24.5	0.0	0.2	0.5	0.1	0.4	0.0
N - Economic History	16.7	3.7	27.8	16.8	35.4	2.7	5.1	3.2	1.9	1.2
O - Economic Development, Growth	18.7	6.3	14.8	20.8	31.8	6.7	6.9	6.8	7.4	5.8
P - Economic Systems	13.1	1.2	6.1	20.1	22.3	4.5	5.0	5.1	4.4	3.7
Q - Agricultural and Environmental Econ.	9.6	3.1	8.0	9.6	23.1	1.9	2.7	2.4	1.3	1.3
R - Urban, Rural, and Regional Economics	10.5	14.2	0.0	7.5	23.1	1.4	2.5	1.7	1.0	0.8
Z - Other Special Topics	7.4	0.0	0.0	16.1	12.5	1.1	1.4	1.1	1.1	1.1

**Table C-2**  
**BSA decomposition of changes in S index**  
(Individual weights: 1/ no. of fields)

	1976-1985/before 1976			1986-1995/1976-1985			1996-2005/1986-1995		
	Sex	Field	Total	Sex	Field	Total	Sex	Field	Total
	comp	weight		comp	weight		comp	weight	
<b>Total</b>	<b>-4.4</b>	<b>-3.4</b>	<b>-7.7</b>	<b>-4.1</b>	<b>-0.2</b>	<b>-4.3</b>	<b>-6.4</b>	<b>-1.0</b>	<b>-7.4</b>
A - General Economics and Teaching	0.0	-0.2	-0.2	0.1	0.0	0.1	0.1	0.0	0.1
B - Schools of Economic Thought and Method.	0.3	-0.4	-0.1	0.0	0.0	0.0	0.0	0.1	0.1
C1 - Mathematical and Quantitative Methods	-1.0	0.9	-0.1	1.6	-0.1	1.5	-2.3	0.0	-2.3
C2-Econometrics	-1.0	-0.2	-1.2	1.2	0.6	1.8	-1.0	-0.1	-1.1
D - Microeconomics	0.2	0.4	0.6	0.2	0.1	0.3	-2.0	-0.2	-2.2
E - Macroeconomics and Monetary Economics	0.9	-0.2	0.7	-1.2	0.0	-1.3	1.0	0.0	1.0
F - International Economics	0.8	-0.5	0.3	-0.3	0.0	-0.4	-0.7	0.1	-0.6
G - Financial Economics	-0.2	0.1	-0.1	-0.8	0.1	-0.8	1.6	-0.3	1.3
H - Public Economics	-0.4	-0.2	-0.6	2.5	-0.7	1.8	-1.6	0.0	-1.7
I - Health, Education, and Welfare	-4.0	-0.7	-4.7	-0.2	0.4	0.3	-0.6	-0.5	-1.1
J - Labour and Demographic Economics	-2.2	-0.4	-2.6	0.7	0.2	0.9	-2.2	0.2	-2.0
K - Law and Economics	-0.3	-0.4	-0.7	-0.2	0.0	-0.1	-0.1	0.0	-0.1
L - Industrial Organization	-0.2	0.7	0.5	-1.9	-0.1	-1.9	0.6	0.2	0.9
M -Business Economics	0.0	-0.2	-0.2	0.1	0.3	0.4	-0.4	0.0	-0.4
N - Economic History	3.3	-0.6	2.7	-3.0	-0.1	-3.1	0.5	-0.2	0.3
O - Economic Development, Growth	0.6	0.2	0.8	-1.7	0.0	-1.7	1.5	-0.3	1.2
P - Economic Systems	-0.8	-0.1	-0.9	-0.9	-0.1	-1.0	0.1	-0.1	0.0
Q - Agricultural and Environmental Econ.	-0.2	-0.1	-0.3	0.5	-0.3	0.2	-0.4	0.0	-0.4
R - Urban, Rural, and Regional Economics	-1.2	-0.4	-1.7	-0.3	-0.3	-0.6	-0.4	0.0	-0.4
Z - Other Special Topics	0.1	-0.2	-0.2	-0.5	0.0	-0.5	0.2	0.0	0.2